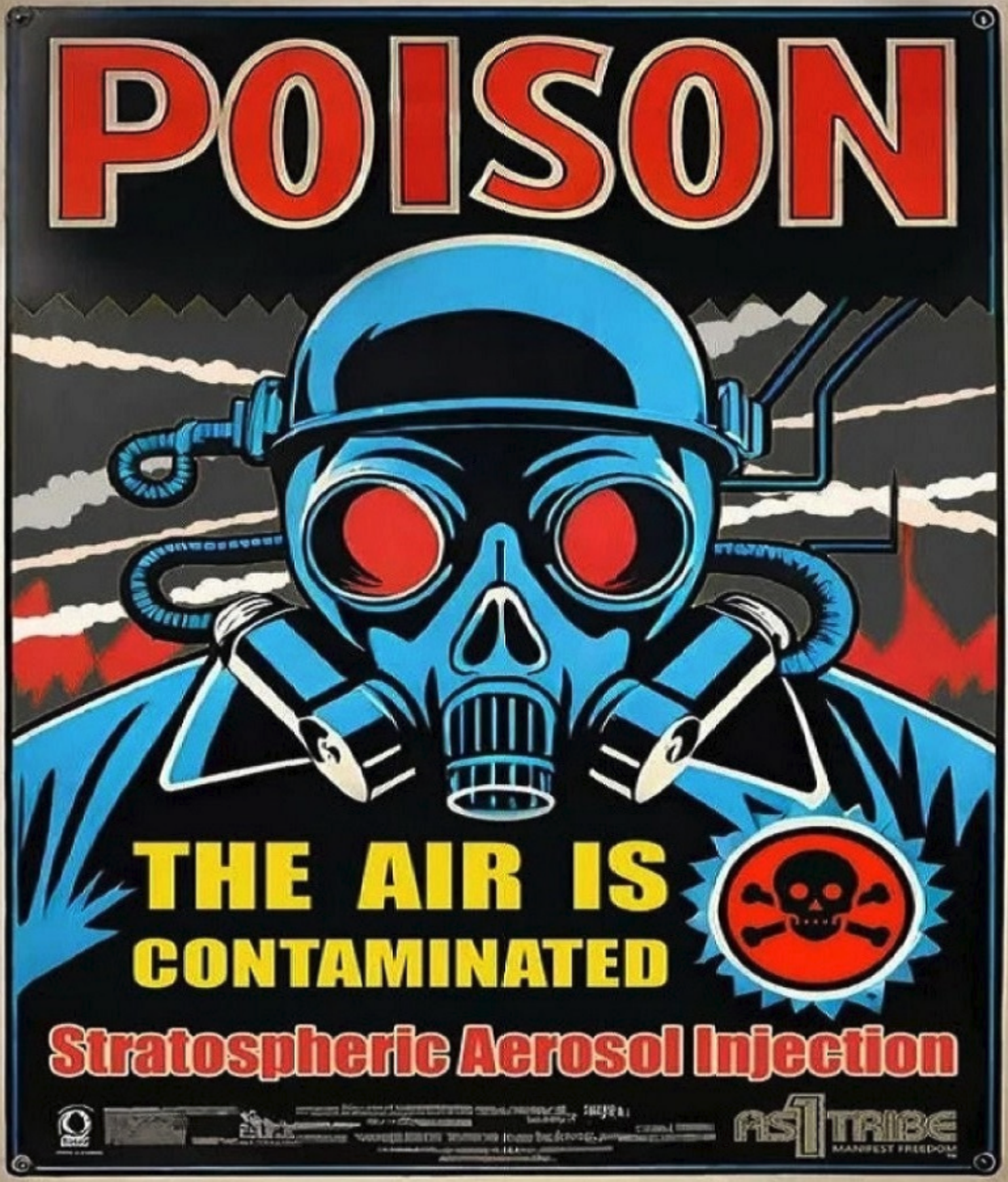
POISON
THE AIR IS
CONTAMINATED
Stratospheric Aerosol Injection
AS1 TRIBE
MANIFEST FREEDOM

1520a. Restrictions on use of human subjects for testing of chemical or biological agents

(a) Prohibited activities

The Secretary of Defense may not conduct (directly or by contract)-

(1) any test or experiment involving the use of a chemical agent or biological agent on a civilian population; or

(2) any other testing of a chemical agent or biological agent on human subjects.

(b) Exceptions

Subject to subsections (c), (d), and (e), the prohibition in subsection (a) does not apply to a test or experiment carried out for any of the following purposes:

(1) Any peaceful purpose that is related to a medical, therapeutic, pharmaceutical, agricultural, industrial, or research activity.

(2) Any purpose that is directly related to protection against toxic chemicals or biological weapons and agents.

(3) Any law enforcement purpose, including any purpose related to riot control.

(c) Informed consent required

The Secretary of Defense may conduct a test or experiment described in subsection (b) only if informed consent to the testing was obtained from each human subject in advance of the testing on that subject.

(d) Prior notice to Congress

Not later than 30 days after the date of final approval within the Department of Defense of plans for any experiment or study to be conducted by the Department of Defense (whether directly or under contract) involving the use of human subjects for the testing of a chemical agent or a biological agent, the Secretary of Defense shall submit to the Committee on Armed Services of

the Senate and the Committee on Armed Services of the House of Representatives a report setting forth a full accounting of those plans, and the experiment or study may then be conducted only after the end of the 30-day period beginning on the date such report is received by those committees.

(e) "Biological agent" defined

In this section, the term "biological agent" means any micro-organism (including bacteria, viruses, fungi, rickettsiac, or protozoa), pathogen, or infectious substance, and any naturally occurring, bioengineered, or synthesized component of any such micro-organism, pathogen, or infectious substance, whatever its origin or method of production, that is capable of causing-

(1) death, disease, or other biological malfunction in a human, an animal, a plant, or another living organism;

(2) deterioration of food, water, equipment, supplies, or materials of any kind; or

Geoengineering Types and their Impact On Health and the Environment:

Geoengineering refers to deliberate interventions in the Earth's climate system. Here are the main types of geoengineering, along with the dispersants used and their potential impacts on health and the environment:

•Geoengineering Type: Stratospheric Aerosol Injection (SAI)

Dispersants:

1. Sulfur Dioxide (SO_2)

- Health Impact: Can cause respiratory issues, aggravate asthma, and increase cardiovascular diseases.

- Environmental Impact: Contributes to acid rain, harms ecosystems, and influences climate patterns.

2. Calcium Carbonate ($CaCO_3$)

- Health Impact: Generally considered safe, but inhalation can cause respiratory irritation.

- Environmental Impact: May alter soil chemistry and affect aquatic systems through runoff.

3. Titanium Dioxide (TiO_2)

- Health Impact: Potential lung irritant; concerns about toxicity and carcinogenicity if inhaled.

- Environmental Impact: Bioaccumulation in aquatic systems; impacts on plant growth and soil organisms.

4. Silicon Dioxide (SiO_2)

- Health Impact: Respiratory issues and lung disease (silicosis) with prolonged exposure.

- Environmental Impact: Can affect soil quality and water systems; potential effects on flora and fauna.

5. Aluminum Oxide (Al_2O_3)

- Health Impact: Potential neurotoxic effects, may be linked to Alzheimer's disease.

- Environmental Impact**: Accumulation in ecosystems; potential harmful effects on soil acidity and water quality.

6. Zinc Oxide (ZnO)

- Health Impact: Skin irritant; respiratory issues if inhaled.

- Environmental Impact: Can be toxic to aquatic life at high concentrations; potential to accumulate in habitats.

7. Barium Salt Compounds (e.g., Barium Chloride)

- Health Impact: High doses can cause gastrointestinal issues and muscle weakness; concern over long-term exposure.

- Environmental Impact: Toxic to aquatic environments; alters soil chemistry.

Each dispersant has unique health risks and environmental impacts, requiring thorough research and monitoring before deployment in geoengineering practices.

•Geoengineering Type: Marine Cloud Brightening (MCB)

- Marine cloud brightening (MCB) involves injecting particles into marine clouds to increase their reflectivity. Here are some known dispersants used in MCB, along with their potential health impacts and environmental consequences:

Dispersants:

1. Sodium Chloride (Salt)

- Health Impacts: Minimal direct health effects at aerosol levels; however, high salt concentrations can affect respiratory health in coastal areas.

- Environmental Impact: Salt is naturally occurring in the ocean, thus has lower ecological disruption; however, can alter the local salinity of surrounding water and impact marine life.

2. Sea Spray Aerosols

- Health Impacts: Generally low health risks, with some potential respiratory irritation in sensitive populations.

- Environmental Impact: Can increase cloud droplet concentrations, enhancing precipitation patterns but may affect local weather systems and ecosystems.

3. Calcium Carbonate (Lime)

- Health Impacts: Dust from calcium carbonate can irritate the respiratory system; exposure to high levels may result in lung issues.

- Environmental Impact: Naturally occurring, but excessive application can lead to alterations in ocean chemistry and sediment processes.

4. Bicarbonate Compounds

- Health Impacts: Relatively low toxicity; risks mainly associated with aerosol inhalation can affect respiratory health if concentrations are high.

- Environmental Impact: May alter marine biogeochemistry but generally considered less harmful than sulfates or chlorides.

5. Titanium Dioxide

- Health Impacts: Potential respiratory irritant and possible carcinogen with long-term exposure; stringent safety measures advised during handling.

- Environmental Impact: Could impact marine organisms and ecosystems due to toxicity and accumulation; concerns about long-term ecological effects.

6. Sulfate

- Health Impacts: Known to cause respiratory issues and can exacerbate conditions like asthma and bronchitis; can lead to acid rain.

- Environmental Impact: Can affect freshwater and terrestrial ecosystems; contributes to acidification of oceans and waterways, harming marine life.

Each of these dispersants presents a trade-off between potential cooling effects and possible health and environmental risks. Ongoing research is essential to assess the full scope of these impacts before implementing MCB at scale.

•Geoengineering Type: Cirrus Cloud Thinning (CCT)

Cirrus cloud thinning (CCT) aims to reduce cirrus cloud cover to enhance radiative forcing and combat climate change. Here are some dispersants considered for CCT, along with their potential health impacts and environmental consequences:

Dispersants:

1. Sodium Chloride (Salt)

- Health Impacts: Minimal health risks; high concentrations can cause respiratory irritation in people living nearby.

- Environmental Impact: Naturally occurring; low ecological disruption, but excessive application can alter local water salinity.

2. Sulfate Aerosols

- Health Impacts: Associated with respiratory problems, aggravating conditions like asthma; exposure can lead to heart and lung diseases.

- Environmental Impact: Contributes to acid rain, affecting freshwater and soil ecosystems; potential to harm plant and animal life.

3. Supercooled Water Droplets (Cloud Seeding Agents)

- Health Impacts: Relatively low direct health risks; however, the introduction of additional moisture may impact respiratory conditions.

- Environmental Impact: Can alter local weather patterns and hydrology but generally viewed as low risk for negative ecological effects.

4. Calcium Carbonate (Lime)

- Health Impacts: Dust can irritate the respiratory tract; prolonged exposure might lead to chronic respiratory issues.

- Environmental Impact: Naturally present but excessive use can disrupt local sediment processes and alter water chemistry.

5. Bicarbonate Compounds

- Health Impacts: Lower toxicity levels; may cause irritation if aerosolized and inhaled in large quantities.

- Environmental Impact: Limited long-term ecological impact; could affect marine biogeochemical processes.

6. Organic Compounds (e.g., Indole, DMS)

- Health Impacts: Potential respiratory irritants; specific health data is limited but generally viewed as low risk.

- Environmental Impact: May impact local flora and fauna; increased concentrations could disrupt natural habitats.

Evaluating these dispersants requires a thorough understanding of their potential risks and benefits. Continued research is vital to ensure that the ecological and health impacts are adequately addressed before large-scale deployment.

•Geoengineering Type: Carbon Dioxide Removal (CDR)

Dispersants in carbon dioxide removal (CDR) generally refer to agents used to enhance the dissolution of CO_2 in seawater or facilitate its transport. Here's a list of common dispersants along with their health and environmental impacts:

Dispersants:

1. Sodium Carbonate

- Health Impacts: Mild irritant to skin and eyes, potential respiratory irritant in high concentrations.

- Environmental Impacts: Increases alkalinity in water; can affect aquatic life if concentrations are too high.

2. Ethylene Glycol

- Health Impacts: Toxic if ingested, may cause headaches, dizziness, and respiratory issues.

- Environmental Impacts: Can be harmful to aquatic ecosystems; may cause bioaccumulation.

3. Polysorbates (like Polysorbate 80)

- Health Impacts: Generally recognized as safe, but high doses may cause gastrointestinal issues.

- Environmental Impacts: Low toxicity to aquatic organisms; responsible for increasing bioavailability of nutrients.

4. Surfactants

- Health Impacts: Depending on the type, some can be toxic or irritating to skin/eyes.

- Environmental Impacts: May disrupt aquatic environments and biofilms; some are biodegradable while others are persistent pollutants.

5. Alcohol Ethoxylates

- Health Impacts: Can cause skin and eye irritation; the toxicity depends on the specific formulation.

- Environmental Impacts: Generally low toxicity to aquatic life but can lead to oxygen depletion in water bodies.

6. Sea Water as Dispersant

- Health Impacts: Non-toxic, generally safe.

- Environmental Impacts: Minimal, but large-scale use can alter local salinity and pH levels.

7. Acetic Acid

- Health Impacts: Corrosive in concentrated forms, can cause burns and respiratory issues.

- Environmental Impacts: Can lower pH in water, affecting marine life; must be used carefully.

8. Lactic Acid

- Health Impacts: Generally safe in low concentrations, though high concentrations can cause irritation.

- Environmental Impacts: Biodegradable and less harmful to aquatic life; helps in mineralization processes.

Summary

While dispersants can enhance the efficiency of CO_2 removal processes, careful consideration of their health and environmental impacts is crucial. Regulatory frameworks and monitoring are essential to mitigate any negative effects.

•Geoengineering Type: Soil Carbon Sequestration

- Soil carbon sequestration involves various methods to enhance the storage of carbon in the soil. Dispersants, often used in agricultural practices, can influence soil health and carbon sequestration. Here’s a list of common dispersants along with their potential health and environmental impacts:

1. Sodium Polyacrylate

- Health Impacts: Can cause skin and eye irritation, respiratory issues if inhaled.

- Environmental Impacts: May affect soil microbial activity and water retention negatively with excessive use.

2. Sodium Dodecyl Sulfate (SDS)

- Health Impacts: Irritation to skin, eyes, and respiratory tract.

- Environmental Impacts: Toxic to aquatic life, can degrade soil health if runoff occurs.

3. Surfactants (non-ionic and anionic)

- Health Impacts: May cause skin irritation or allergic reactions; long-term exposure effects are less understood.

- Environmental Impacts: Can accumulate in water bodies and affect aquatic ecosystems; potential toxicity to soil organisms.

4. Polysaccharides (e.g., xanthan gum)

- Health Impacts: Generally regarded as safe, but excessive exposure can lead to mild irritations.

- Environmental Impacts: Biodegradable, positive effects on soil structure and moisture retention but can alter microbial dynamics if used in high concentrations.

5. Humic Substances

- Health Impacts: Generally non-toxic; improves soil health and plant growth.

- Environmental Impacts: Enhances soil carbon storage and fertility, enhances microbial activity.

6. Biosurfactants (e.g., rhamnolipids)

- Health Impacts: Lower toxicity compared to synthetic surfactants; some can promote allergies.

- Environmental Impacts: Biodegradable, can enhance soil health and carbon sequestration positively.

7. Organic Acids (e.g., citric acid)

- Health Impacts: Potential irritant to skin and eyes, but generally safe in low concentrations.

- Environmental Impacts: Can aid in nutrient availability but excessive use can lead to soil acidification.

General Considerations

- The use of dispersants should be balanced with potential benefits for soil health and carbon sequestration.

- Overapplication can lead to negative effects on soil biodiversity and ecosystem function.

- Monitoring and regulation are essential to mitigate risks associated with these agents.

•Geoengineering Type: Bioenergy with Carbon Capture and Storage (BECCS)

Dispersants:

Dispersants in bioenergy with carbon capture and storage (CCS) include surfactants that aid in improving the efficiency of biological processes and capturing carbon. Here's a list of some common dispersants along with their health and environmental impacts:

1. Surfactants (e.g., Triton X-100, Tween)

- Health Impacts: Can cause skin irritation, respiratory issues, and eye irritation. Prolonged exposure may affect internal organs.

- Environmental Impacts: Potential toxicity to aquatic life, bioaccumulation, and disruption of microbial communities.

2. Detergents (e.g., Sodium Lauryl Sulfate)

- Health Impacts: Skin and eye irritant, can cause gastrointestinal irritation if ingested.

- Environmental Impacts: Low biodegradability can lead to pollution in water bodies, affecting aquatic organisms.

3. Non-ionic surfactants (e.g., Ethoxylated Alcohols)

- Health Impacts: Generally low toxicity but can cause irritation and allergic reactions in some individuals.

- Environmental Impacts: Moderate impact on aquatic life; can be biodegradable, reducing long-term pollution.

4. Alkyl Polyglucosides (APGs)

- Health Impacts: Low toxicity and generally safe for humans.

- Environmental Impacts: Biodegradable and low toxicity to aquatic organisms, making them more environmentally friendly.

5. Cationic surfactants (e.g., Benzalkonium Chloride)

- Health Impacts: Can be toxic if ingested; skin and eye irritant.

- Environmental Impacts: Highly toxic to aquatic life and can have long-lasting effects on ecosystems.

6. Anionic surfactants (e.g., Linear Alkylbenzene Sulfonate)

- Health Impacts: Can cause skin irritation and allergic reactions.

- Environmental Impacts: Toxic to fish and other aquatic organisms; may contribute to eutrophication.

7. Natural dispersants (e.g., Saponins)

- Health Impacts: Generally safe but can cause allergic reactions in sensitive individuals.

- Environmental Impacts: Biodegradable and less harmful to ecosystems, with potential benefits for soil health.

Conclusion:

While dispersants enhance bioenergy systems and carbon capture, their impacts are varied and require thorough assessment to mitigate health and environmental risks. Regulations and best practices are necessary to minimize harmful effects.

7. Solar Radiation Management (SRM)

Solar radiation management (SRM) involves various dispersants, though it is still largely theoretical and not yet implemented on a large scale. Here are some of the proposed dispersants and their potential health and environmental impacts:

1. Sulfur Dioxide (SO_2):

- Health Impacts: Respiratory problems, eye irritation, and potential aggravation of pre-existing health conditions like asthma.

- Environmental Impacts: Can lead to acid rain, affecting soil and water bodies, and harm ecosystems and biodiversity.

2. Calcium Carbonate ($CaCO_3$):

- Health Impacts: Generally considered safe for human health; however, inhalation of dust can irritate the respiratory tract.

- Environmental Impacts: Can cause ocean acidification if used in marine environments, affecting aquatic life.

3. Alumina (Aluminum Oxide):

- Health Impacts: Potential neurotoxicity with excessive exposure; links to Alzheimer's disease are still under study.

- Environmental Impacts: Can accumulate in soils and water systems, posing risks to plants and aquatic organisms.

4. Sea Salt (Sodium Chloride):

- Health Impacts: Generally safe; however, high concentrations can lead to respiratory issues when aerosolized.

- Environmental Impacts: Can affect local climates, soil salinity, and freshwater ecosystems.

5. Titanium Dioxide (TiO_2):

- Health Impacts: Potential respiratory irritant if inhaled in large quantities; classified as a possible carcinogen.

- Environmental Impacts: Can be harmful to aquatic organisms and may have adverse effects on the environment when released in large amounts.

6. Zinc Oxide:

- Health Impacts: Low toxicity but can cause respiratory issues if inhaled; cumulative exposure may result in more severe effects.

- Environmental Impacts: Can be toxic to aquatic life; may accumulate in biologic organisms.

7. Barium Titanate:

- Health Impacts: Limited data on health effects; potential lung irritant.

- Environmental Impacts**: Can have negative effects on ecosystems if released in significant quantities.

Each dispersant's potential uses must consider careful assessment of ecological and health impacts. As SRM technologies are explored, ongoing research is essential to understand these consequences fully.